REMARKS

Introduction

Claims 1-5, 8, 10-12, 14-15, 17-20, 22-31 and 33-40 are pending in this application, with claims 1, 18 and 29 being independent. Claims 1, 4-5, 8, 14-15, 18, 22-23, 29, and 33-36 have been amended to correct informalities in the claim language and to further clarify the claimed subject matter. Claims 6, 7, 9 to 13, 16, 21, and 32 have been canceled without prejudice or disclaimer of the subject matter thereof. Support for the amendments is found, for example, in the originally filed claims and page 32, line 12-14 of the present specification. Care has been taken to avoid introducing new matter.

Claim Rejection – 35 U.S.C. § 112

Claims 9-11 and 18-40 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully submit that the amendments made to these claims overcome this rejection.

Since claims 9-11, 21 and 32 have been cancelled, the rejection of claims 9-11, 21 and 32 is moot.

The Examiner asserts that the term "soluble polymer" is considered indefinite. Applicants respectfully submit that claims 1, 18 and 29 have been amended to recite "wherein the soluble polymer is soluble in a water or an organic solvent," and "wherein the soluble polymer or the paraffin is in a solid state at a temperature ranging from 15 to 30°C," to more clearly define the claimed subject matter. As such, Applicant respectfully submit that all claims are definite under 35 U.S.C. § 112, second paragraph. It is requested that the Examiner withdraw the rejection of claims 9-11 and 18-40 under 35 U.S.C. § 112, second paragraph.

Claim Rejection - 35 U.S.C. § 103

Claims 1, 5-6, 8 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga (JP 2003059611) in view of Dews (USP 3,859,139). Claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and further in view of Aubrey (USP 4,978,452). Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and further in view of Miura (Abstract: The influence of node-fibril morphology on healing of high porosity expanded polyetrafluoroethylene grafts). Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and further in view of Weege (Basic Impregnation Techniques). Claims 7 and 9-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and further in view of Hashizume (USP 5,946,556). Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and further in view of Amundson (USP 6,498,114). Claims 12-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Amundson and further in view of Orio (USP 4,533,445) and Formanek (USP 5,128,207). Claims 18-19, 22, 24-25 and 27-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Aubrey and Amundson and Ferrara (USP 3,791,939). Claim 20 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Aubrey and Amundson and Ferrara, and further in view of Miura. Claims 21 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Aubrey and Amundson and Ferrara, and further in view of Hashizume. Claim 20 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Aubrey and Amundson and Ferrara, and further in view of Orio and Formanek. Claims 29-30, 35 and 37-40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews

and Amundson and Ferrara, further in view of Echigo (USP Publication 20020029906). Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Amundson and Ferrara and Echigo, further in view of Miura. Claims 32-34 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haga in view of Dews and Amundson and Ferrara and Echigo, further in view of Orio and Formanek. Applicants respectfully traverse these rejections for at least the following reasons.

Regarding independent claim 1, the Examiner concedes that Haga fails to disclose "Step 1 of impregnating the porous structure of a porous resin base with a liquid or a solution," "Step 2 of forming a solid substance from the liquid or the solution impregnated" and "Step 4 of melting or dissolving the solid substance to remove it from the interior of the porous structure" as recited by claim 1. The fact that Haga does not teach Steps 1-2 and 4 is also apparent from the paragraph [0041] of Haga. Paragraph [0041] of Haga discloses,

> "In FIG. 4(a), an ePTFE sheet 41 having a thickness of 100 μm was first provided as an electrically insulating porous material, and the ePTFE sheet 41 was irradiated with synchrotron radiation or laser beam having a wavelength of 250 nm or less through a mask absorber 40 composed of tungsten and having a predetermined pattern. The exposed portions 41a of the ePTFE were decomposed to form perforations extending through in a thickness-wise direction of the sheet, thereby providing a structure composed of only portions 41b screened by the mask absorber in the ePTFE. This structure is illustrated in FIG. 4(b)."

The Examiner then attempts to remedy the deficiencies of Haga relying on Dews. Specifically, the Examiner asserts:

> "Dews remedies this. Regarding claim 1, Dews teaches a method of making a composite, where the method includes filling the pores of a porous hydrophilic matrix with a filler, solidifying the filler, treating the matrix while the filler is in solidified form, and thereafter removing the filler [abstract], where the matrix may comprise of polymeric material [col 2, ln 18]."

Applicants disagree. The abstract of Dews discloses,

> "Method of making a composite electrolyte matrix/electrode assembly comprising filling the pores of a porous hydrophilic matrix resistant to alkali or acid electrolyte with a completely volatile filler such as water, solidifying the filler, applying a catalytic mixture to the surfaces of the matrix while the filler is in the solidified form, and thereafter removing the filler. The filler, being present while the catalyst is applied to the matrix, prevents the catalytic particles which are electrically conductive from impregnating the matrix which can cause internal cell shorting. Further, a catalyst layer with a uniform, flat surface is obtained."

Specifically, Dews describes:

> "A preferred example of the invention is as follows:
> A fibrous asbestos matrix, 15 millimeters thick, is uniformly impregnated with water. While impregnated, the fibrous matrix is cooled to -l0°C. to completely solidify the water. Thereafter, a uniform suspension of polytetrafluoroethylene and platinum black is applied to each surface of the matrix. The suspension comprises 70 percent platinum black and 30 percent colloidal polytetrafluoroethylene. The coating is applied to provide a catalyst loading of 4 mg/cm^2. After gentle pressing of the catalyst layers into the matrix, the structure is gently heated to a maximum temperature of about 280°C., at which temperature the solidified water is completely removed and the polymer catalyst layer bonded to the matrix. A cross-section of the electrode establishes that the catalyst layer is a substantially flat line across the electrode surface" (column 3, lines 14-30).

In other words, Dews uses water in a solidified state for the purpose of preventing the suspension of the catalyst from entering into the fibrous asbestos matrix and making the catalyst layer flat on the surface of the fibrous asbestos matrix. This fact is also apparent from the following disclosure as to the volatile material and catalyst layer in Dews.

> "In addition to protecting against impregnation of catalyst through the matrix, the volatile material, when gasified, can improve the porous nature of the electrode" (column 3, lines 10-13),

> "Additionally, in the composite electrolyte matrix/electrode assembly of the present invention, the catalyst layer has flat, uniform surface across the face of the electrolyte matrix, improving the geometric design of the cell and making more efficient use of catalyst" (column 1, lines 51-55).

As such, it is clear that, at a minimum, Dews fails to disclose "Step 3 of forming a plurality of perforations extending through from the first surface of the porous resin base having

the solid substance within the porous structure to the second surface in the porous resin base" as recited by claim 1.

The Examiner also asserts that "[i]t would have been obvious to one with ordinary skill in the art at the time of the invention to impregnate the porous base with a liquid or solution. One would have been motivated to do so to prevent unwanted treatment of the internal pores of the porous base [Dews, col 2, ln 5-7] and to desirably treat specific areas (i.e. surface of cavities) of the porous base for a desirable final product." Applicants disagree.

Dews only describes, at col. 2, lines 5-7, that "[a]n electrode assembly is provided, with the internal pores of matrix being free, or substantially free, of catalyst with the catalyst layer forming a flat, uniform surface on the polymer matrix." Accordingly, Dews appears to disclose that the pores of the matrix are free of catalyst, and the catalyst layer is flat. However, Dews does not disclose anything about the fact that the technique of volatile matrix is used in forming a plurality of perforations.

In contrast, in the present disclosure, the problems in "forming a plurality of perforations" are disclosed as follows:

> "When a porous resin material (hereinafter referred to as "porous resin base") formed in the shape of a substrate is perforated by a machine-working method, however, the base itself is deformed, the porous structure of edges and inner wall surfaces of perforations is collapsed, and burr occurs on opening portions of the perforations, so that it is extremely difficult to form perforations with high precision while retaining the porous structure. Even when the method of perforating by ultrasonically vibrating the tip of a tool is applied to the porous resin base, it is difficult to form perforations with high precision.
>
> When the porous resin base is perforated by irradiation of laser beams, peripheries of perforated portions are melted and deformed by heat, or the porous structure of edges and inner wall surfaces of perforations is collapsed. The chemical etching method permits a porous resin base to be perforated according to the kind of the resin forming the porous resin base. However, this method is unsuitable for a method for perforating a porous resin base composed of a corrosion-resistant resin. The porous resin base has a possibility that it may be perforated by irradiation of short-wavelength laser beams such as excimer laser. However, it

> takes a long time to work it, and so the cost thereof is expensive" (page 3, line 23 to page 4, line 19 of the specification).

As such, it is clear that one with ordinary skill in the art would not recognize the above mentioned problems without referring to the present disclosure.

Claim 1 was also rejected under 35 USC 103(a) as being unpatentable over Haga in view of Dews and further in view of Aubrey. Aubrey (US 4,978,452) discloses the following technology:

> "A method for producing a wax impregnated filter structure having improved dimensional tolerance for investment casting applications which comprises: providing a blank sheet of ceramic foam filter material; impregnating said filter material with liquid wax; allowing said wax to solidify; and forming a wax impregnated filter structure having peripheral edges with exposed ceramic surfaces by precision cutting said pre-impregnated sheet into at least one filter having a desired set of dimensions, whereby said peripheral edges allow said filter structure to adhere to a ceramic shell building in an investment casting apparatus." (claim 1 of Aubrey)

The Examiner asserts that "[r]egarding claim 1, it would have been obvious to impregnate a porous base with a solidifying agent prior to making the perforations. One would have been motivated to do so in order to increase dimensional control and cost reductions [Aubrey, col 4, ln 50-53]." However, the technology disclosed in Aubrey relates to "a blank sheet of ceramic foam filter material" as apparent from the above-described claim 1 of Aubrey. Accordingly, since the technology disclosed in Aubrey relates to ceramic, it is apparent that Aubrey is not analogous art to the present disclosure. Hence, Aubrey fails to recognize or even suggest the problems in "forming a plurality of perforations" in the porous resin base.

In addition, the Examiner asserts that Aubrey discloses "[a]s previously discussed, forming the filters in this manner provides improved dimensional control and significant cost reductions." (col 4, ln 50-53). However, "forming a plurality of perforations" is not described

herein. Specifically, Aubrey only describes cutting as demonstrated by the following passage: "[a]fter the wax has solidified, the filter blank/wax composite is cut into smaller sized filters pieces having a desired set of dimensions required for the final application." (col 4, ln 43-46). In other words, with respect to "cut," Aubrey discloses that "[f]or example, the blank/wax composite may be cut into 2"x2", 2"x3", or 3"x4" pieces using a diamond saw having dimensional cutting capabilities of approximately ±0.005 inches, or any other defined method."

Accordingly, it is clear that one of ordinary skill in the art would not be able to arrive at the present subject matter from the technology disclosed in Aubrey without referring to the Applicants' disclosure.

Applicants further submit that claim 1 has been amended to incorporate the subject matter of claims 9 and 12.

In rejecting original claim 9, the Examiner relies on Hashizume. Hashizume discloses as follows:

> "A fabrication method of a semiconductor device, comprising: a first step of melting a wax with a property of being solid at room temperature due to heat and coating said melted wax to cover bonding terminals of an IC chip, thereby forming a wax layer at a location where a cavity of a plastic package is formed, a second step of covering said wax layer and said IC chip with a thermosetting resin dissolved in a solvent; a third step of curing said coated thermosetting resin to form a plastic package and melting said wax layer to penetrate into said plastic package due to application of heat at a first temperature, thereby forming said cavity inside said plastic package at said location where said wax layer has been formed; and a fourth step of vaporizing a residue of said wax layer left in said cavity due to application of heat at a second temperature, thereby removing said residue from said cavity." (claim 1 of Hashizume)

The Examiner asserts that Hashizume discloses,

> "a method of fabricating a semiconductor device, where a paraffin wax is used to mask a cavity in the device[abstract]. The prior art further teaches the paraffin wax solidifies at room temperature (i.e., 15°C) [col 11, ln 3-6], where it would have been apparent that the melting point of the paraffin would have been at least

> 15°C or higher. Moreover, it would have been obvious to one with ordinary skill in the art to elect a substance with optimal solidifying or melting temperature that is similar to the substance provided by the prior art to expect similar material properties. It would have been obvious to one with ordinary skills in the art at the time of the invention to use paraffin as the solidifying material."

However, Hashizume discloses,

> "The characteristic improvement in the PCT was caused by not only the fact that the paraffin wax itself has a hydrophobic property but also the fact that the vapor of the paraffin wax entered the micro pores and minute defects existing in the epoxy resin used for the supporting member 2 and the cover 7 and closed them. Due to the closing of the micro pores and minute defects, the air-tight characteristic of the supporting member 2 and the cover 7 was improved and accordingly, the moisture and any other impurity were able to be prevented from entering the cavity 8" (column 17, lines 26-35).

Thus, it is clear that Hashizume uses the paraffin wax for the purpose of "being able to prevent the moisture and any other impurity from entering the cavity 8." Accordingly, it is clear that, at a minimum, Hashizume does not teach anything about "forming a plurality of perforations."

In rejecting original claim 12, the Examiner relies on Orio and Formanek. Specifically, the Examiner asserts that "[r]egarding claims 12-16, Orio teaches a UV curable coating composition comprising acrylated or methacrylated oligomers is suitable as a mask for electronic devices [abstract], where it would have been apparent that the composition would undergo chemical reaction upon exposure to UV light. It would have been obvious to one with ordinary skills in the art at the time of the invention to use a UV masking composition."

Orio appears to disclose,

> "A U.V. curable coating composition comprising an acrylated or methacrylated oligomer in a concentration of from 30 to 70 weight percent of the composition, a photoinitiator in a concentration of from 1 to 12 weight percent of the composition and a monomer that is a mixture of an acrylate or methacrylate of an alkoxylated polyol having an average functionality of 2 or greater and a monofunctional ethylenically unsaturated compound having a single terminal ethylenic group, each in a concentration of from 5 to 35 percent of the composition" (claim 1 of Orio).

However, Orio only discloses the use of the UV curable coating composition as follows:

> "The subject invention is directed to an organic coating material for electronics manufacture which can be used for a variety of purposes including use as a conformal coating, as a stop-off mask and in one embodiment, finds use as a U.V. curable solder mask that exhibits excellent adhesion to many metals used in electronics manufacture" (column 2, lines 46-52 of Orio).

Accordingly, Orio does not teach anything about "forming a plurality of perforations."

The Examiner also asserts that "Formanek provides further evidence that polymethyl methacrylate (part of the methacrylate family) in solution is known in the art to be used as a mask suitable for micro-electronics [col 1, ln 20-25]; where the prior art teaches such mask can be removed by a solvent such as acetone [Amundson, col 7, ln 3], also evidenced by the applicant's specification in paragraph 0152."

Applicants note that Formanek disclose,

> "A method for producing a uniform polymethylmethacrylate layer on a substrate, the layers capable of being set to an arbitrary thickness comprising the steps of: a) producing a solution of polymethylmethacrylate in an ester of lactic acid solvent; b) applying the solution on a substrate in a uniform layer; and c) drying the layer by evaporation of the solvent." With respect to the objective of the invention, Formanek discloses that "[t]he present invention provides a method for producing polymethylmethacrylate (PMMA) layers that are especially uniform and can have varying layer thickness above 20 μm per layer. Utilizing the method of the present invention, uniform PMMA layers having smooth surfaces can be produced having a thickness up to about 40 μm" (column 2, lines 43-49 of Formanek).

Accordingly, Formanek does not disclose or suggest "forming a plurality of perforations." Further, Applicants respectfully submit that the remaining cited references do not cure the deficiencies of Haga, Dews, Hashizume, Aubrey, Orio and Formanek.

Based on the foregoing, Applicants respectfully submit that none of the cited references, taken alone, or in any combination thereof, renders claim 1 or any claim dependent thereon obvious.

Similarly, since claims 18 and 29 recite substantially similar limitations to claim 1, claims 18 and 29 and all claims dependent thereon are patentable for at least the same reasons as

claim 1. Thus, Applicants respectfully request that the Examiner withdraw the rejections of claims 1-5, 8, 10-12, 14-15, 17-20, 22-31 and 33-40 under 35 U.S.C. § 103(a).

Double Patenting

Claims 1-3, 18-20, 29-31, 35, 37-40 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 38-20 of co-pending Application No. 10/551,459 in view of Dews and Aubrey and Amundson. Applicants are submitting a terminal disclaimer herewith. Accordingly, in light of the terminal disclaimer, Applicants request that the Examiner withdraw the double patenting rejection of claims 1-3, 18-20, 29-31, 35, 37-40 based on Application No. 10/551,459.

Claims 1-3, 18-20, 29-31, 35, 37-40 were also provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of co-pending Application No. 11/660,993 in view of Dews and Aubrey and Amundson and Ferrara. Applicants respectfully traverse this rejection. It is respectfully submitted that as discussed above, it would not have been combine Haga with Dews, Aubrey, Amundson and Ferrara. Similarly, the present subject matter of claims 1-3, 18-20, 29-31, 35, 37-40 is not obvious over co-pending Application No. 11/660,993. Thus, Applicants request that the Examiner withdraw the double patenting rejection of claims 1-3, 18-20, 29-31, 35, 37-40 based on Application No. 11/660,993.

Conclusion

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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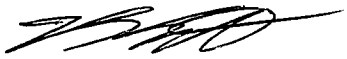

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